Microwave Visions

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I.
Tempting Towers

In 1985 and 1986 Doric Telecom Properties made substantial investments into a relatively unknown arena of telecommunications. US Congress in turn created this situation, when they passed the first substantial re-write of the basic law that governed telecommunications since 1937, in 1984. Suddenly it was possible to create new companies, where only monopolies like AT&T, Western Union and ITT/WorldCom had invested before.

By taking advantage of the topography of the area, the founders of what became known as ***Bay Area Teleport*** leased space, purchased roof rights and built from scratch a network based on digital microwave radio that became the envy of other carriers.

These investors knew what they were doing. They had Northern Telecom not only sell them the brand new technology just then becoming popular, but to actually engineer the sites and build them to full commercial standards. Where there was a population center with very few high-rise buildings, the investment committee decided to find the tallest of these, and pay top "penthouse" dollars to secure roof rights. They built tower stubs, ready to add on to in the future.

At a point close to the geographical center of the bay, BAT built the white tower that later became a corporate symbol. From this *Harbor Bay Isle,* a hub of microwave facilities was constructed that still serves to this day.

The other towers were either leased, such as at *Vollmer Peak,* where a landlord had already purchased hilltop land and built telecommunication facilities. But more commonly, BAT leased the land itself and built towers, such as *Mount Allison.*

Lastly there were the flat plane sites, where great heights had to be obtained to overcome Fresnel zone interference. Such sites as *Dozier* require FAA lighting to become licensed.

The effect of all this engineering was to create the finest, most direct and most extensive independent microwave telecommunications network ever built in the area.

The Wireless industry comes to Bay Area

At the same time as allowing companies to compete in the long distance, the 1984 Telecommunications Act opened up sections of the finite and limited natural resource known as the public airwaves to local use. Many investment-engineering firms competed to find investors willing to take substantial risk with first the lotteries, then later auctions, of frequencies allocated by the FCC. The rules were such that the firms had to do the engineering in advance for such opportunities that the FCC was offering. First there was Cellular, the first new wireless telephone service since business band was introduced in the 1950's. Cellular investors were made millionaires and generated lots of interest. The 1980's gold rush was on, as the FCC made possible the "bell bypass" technology MAS, then "interactive video" with IVDS. The 1990's saw the further mining of the limited resource of the public airwaves as UHF paging and PCS come to compete with the older technologies such as VHF two way paging and Cellular.

The effect of all this was to create a wireless industry trade convention show where various tower companies advertised direct to investors. Seeing a business opportunity, real estate investors in the various MSA's[1] built towers and poles to accommodate this fast paced growth. By 1995 the tower facilities in most areas had been fully loaded and there was no room left.

Bay Area Teleport, however, conserved space and rented out very few feet, and usually only those companies with whom they did transmission business, or with whom they leased space at other locations. Thus the BAT tower system, taken as a 70-site group, was vastly under capacity. However, it still generated estimated $1,000,000 month gross revenue in 1992.

BAT also developed a Network Operations Center that offered premiere services to their 25 customers. These services included advance notice of impending service interruptions, as well as proof of performance statistics, were sent every month to every customer. Rebates for lost time that exceeded performance guarantees were automatically calculated and deducted from the bill as well.

Additionally, BAT generated a quarterly financial report that included reports on preventative maintenance statistics, showing how well the goals had been met by

[1] MSA = metropolitan statistical area - the basic method used to calculate radio markets and rank them according to size. There are also RSA's for rural areas, which are geographically larger than MSA's.

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region by month. The budget committee approved significant capital outlays in advance.

BAT introduced the concept of actually managing customer business networking by monitoring call completion records and ordering moves, changes and adds from Pacific Bell as the calling patterns changed, for such customers as Expresstel and Telesphere. This concept of adding services on top of transport actually proved very profitable and worked well as a premium service company.

In December 1993 ICG Telecom Group of Colorado purchased BAT, principally so that ICG could establish a presence in California without having to build from scratch. The principle asset they were seeking was BAT's fiber optic network. BAT had obtained very favorable conduit space rents from the Local Exchange Carrier in return for tradeoffs. Additionally BAT had not only established a fine reputation with their customers, but had indeed gained respect of other major carriers as well.

ICG used BAT's switching facilities and fiber optic network to grow their presence, while neglecting and slowly dismantling their microwave network. Eventually, in 2001, this network was sold, having shrunk to a mere 23 sites.

Western Tele-Communications Inc. buys Sierra Microwave
Global Crossing Inc. buys Allnet Communications

BAT was not the only successful company who deployed Northern Telecom RD6 and RD11 digital microwave radio in the bay area. Allnet and Sierra Microwave also launched in the late 1980's with services into San Francisco. However both of these companies deployed a much larger network extending south along US highway 101 (Allnet), north (interstate 5) and east (interstate 80) by Sierra Microwave. At the time of their deployment, Sierra was getting $50,000 a month per DS3 between San Francisco and Sacramento and quickly filled their radio with 18 DS3's.

By the mid 1990's all three companies had been purchased, and their names changed. Bigger corporations who lacked understanding of premium service that BAT had pioneered tarnished their previous excellent reputations for service. Coupled with the higher costs associated with radio maintenance, all 3 networks had become essentially deserted by the end of 2000. Secondary owners, such as Mountain Union Telecom, came into possession of these networks, mainly for the sites themselves, which they operated as a landlord, rather than owner-operator.

II.
Wireless Power

The first commercial development of microwave radio transmission was made practical in 1948 when Western Union Telegraph Co., and shortly thereafter by AT&T, built transcontinental networks of radio stations. These "long lines" networks had up to 75 repeater sites to span the continent. At they time they represented a significant advance in the state of the art of long distance services by allowing the first use of what we know of today as "broadband" technology.

AT&T, in particular, capitalized on this by expanding their capacity using different frequency bands and clear aperture[2] antennae to solve the nation's needs for Increased traffic. Their sites were built, more than any other carrier, to withstand earthquakes as well as the test of time.

Technology didn't stop and AT&T Laboratories developed in the 1960's the beginnings of today's digital technology with the advent of "T carrier" systems. They limited their scope, however, to "short haul", meaning between central offices in big cities where individual copper wire pairs were in short supply. It took Western Union to develop a regional use for this technology first, in the early 1970's, with the use of special purpose "T screen" cable.

The floodgates were first unleashed within the closed monopoly of telephone and telegraph by two significant events, one political and one technological. The political of course was the great breakup of AT&T, and the technological was the invention of true digital microwave, both in the middle 1980's.

There was also work being done on making practical use of laser for fiber optic cables. The investors behind BAT knew of this, yet decided to concentrate on taking a unique approach. They efforts produced a regional based carrier that utilized the essence of the terrain in the bay: "hill top to building top" to both bypass the Bell operating company and to extend their service to other carriers. BAT also combined this with a long distance service via satellite to offer a "best business connection" and a bypass solution to those firms needing more than usual telecommunications.

The technological pendulum has swung back and forth between wire and wireless over the past century several times. Fiber, it was touted when introduced, would finally put wireless in the museum. If you take a look at a head-to-head competition between long distance radios versus fiber, you quickly see their point. Beginning with capacity, coupled with the FCC's lack of allowing

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[2] **"Clear aperture"**, an antenna type that keeps the path inside the antenna clear of obstructions. These devices, also called "horns" look like a cornucopia device mounted on a hilltop, are heavier, more cumbersome and expensive than standard antennae. The trade off is for improved performance.

new advances into the domestic US microwave market, fiber is no question the hands down winner. A single pair of fibers can now carry DWDM[3] traffic of 40 OC192's, which gets into astronomical amounts of capacity, allowing the giant long distance carriers to offer telephone service at pennies per minute. Because the technology is newer, the mileage between fiber repeaters now approaches 40 miles. A third benefit to allow fiber to dominate is the decreased cost of maintenance per repeater when compared to microwave. It would appear, and many carriers have invested in, the fact that microwave is defeated in terms of providing modern telecommunications.

Yet all is not rosy in fiber. The immense costs on drawing permits in large cities, of digging up the streets and even finding space in urban undergrounds already filled with other pipes have driven many companies to lease space instead. Herein lies the rub—While these giant telecommunication money machines advertise services to compete, operationally they are all using the same conduits and sheaths within conduits together. This means that they all share the same common entrances to certain buildings in downtowns that have come to be called "carrier hotels", because so many companies share space. Landlords of such buildings have formed consortiums that now charge these companies to install conduits between suites. Sharing conduit space with your competitor means that moves changes and additions become common knowledge, and common interruptions frequently occur.

Another problem with fiber cables are the ways that splice cases, where fibers terminate, are often mounted in a hurry and not seismically secure. The author has personally witnessed a major carriers splice case in an underground fault, unlabelled, and standing on the wall inside a competitor's space. When pointed out to the Vice President in charge, with a photograph, his response was to say the case should be locked. To my knowledge, it never was. Local technicians knew that any pocketknife could open the cage, and that many carriers had the same situation in their access.

Fiber also has suffered from excess capacity and poor documentation as carriers have been sold and merged. Many installations are not secure from floods, which can bury cables in mud underground. The ILEC[4] may or may not notify their competitors of such jeopardy situations. Not having control over their own underground conduits has caused some carriers, such as XO, to invest in building their own.

Last, and perhaps most important, is that fiber isn't friendly for local distribution. A recent survey by a fiber carrier found their "lit buildings" in the bay area was .05%. The estimated cost, IF the fiber was running down the street, AND there was a manhole with their fiber in it, AND in that hole was a splice case, the cost

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[3] **DWDM** – Dense Wave Division Multiplexing.. A variant on a well-proven technology, allows stacking DS3's together in ever increasing bumbles to where the aggregate reaches 400 gigabits per second.

[4] **ILEC** – Incumbent Local Exchange Carrier, such as SBC Communications, maintain underground vaults.

involved was $30,000 to bring it into the MPOE[5] in the basement. Thus the sales force for such companies are limited where they can sell without using the ILEC for the "last golden mile" of service.

The solution that most have adopted is to rent a 10 x 10 x 10 foot cage inside the ILEC's central office for $15,000 a month and then get the ILEC to crossconnect the service to their local copper cables. This "last mile" drives up the cost to where the customers to where only major carriers have the customer base to operate profitably. And the CLEC must also have fiber pulled into that location as well. ILEC technicians have been known to cut crossconnects running between cages because they have exclusive rights of connectivity.

Mergers and acquisitions have spelled major trouble for the combined entity as a practical reality. The author was witness to the fact that WorldCom, although they had acquired MCI, Wiltel and MFS, could not connect a DS1 service between suites in a carrier hotel in San Francisco earlier this year. It took local knowledge, not only of the carriers and their relationships, but of the history of who connected to whom a decade ago, to find a simple solution for the customer.

Microwave radio has inherent advantages to solve regional carrier access problems, serve specialized access customers, and act as an ILEC bypass while maintaining control. Compared to relying upon the competition or a third party, having exclusive right of access for backbone DS3 service starts to sound attractive. The FCC, when granting rights to the public airwaves in the form of a license, guarantees that exclusive right of access. Their PCN[6] process is a form of industry self-regulation that actually works well in practice.

Microwave also has distinct industries where the prohibitive cost of laying fiber precludes major carrier access. Specialized markets have come from Utilities, Broadcasters and Wireless companies such as PCS and Cellular who need mountain top or tower access.

Giant money machines in Trouble

More and more companies outside of these industries are becoming fed up with the constant news from the media about how WorldCom has misstated billions and have shocked investors about their credibility on Wall Street. There is a basic mistrust of how giant companies have handled customer service and overcharged. More and more, as companies are brought into court on charges of fraud, such as WorldCom, or bypass paying landlord rents by declaring bankruptcy, such as Global Crossing, ICG, Qwest and XO, customers and

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[5] **MPOE** -- minimum point of entrance. The point, usually in the basement, where telephone companies terminate service. Beyond this point it is the customer who must wire to their floor space.

[6] **PCN** – prior coordination notice. A process whereby prospective microwave licensees serve notice to existing carriers of their intention to occupy space in the air, on a specific frequency, between certain points. Once coordinated, and if no objections are received, only then will the FCC process the application.

investors are looking for a different telecommunications company. A company that has ideas about how it should be done. Ideas that are so old they must be brand new. A company with new ideas about ethics in business, customer care, and labor relations.

The time has indeed come for a regional based wholesale company to provide the ultimate ILEC bypass to ISP's and others who yearn for another way to communicate their business. A new BAT is what is needed, now more than ever.

III.
Capable Stewardship

Common practice by the giants today involves managing by statistics. Workforce performance gets judged not by how well the customer is treated, for that is too hard to quantify, but instead by meeting goals. WorldCom threatened to cancel a DS1 move in February 2002 because the CLEC they were dealing with could not come up with a CFA[7] in a single day. It did not matter that they had never contacted the CLEC before; just that their business cycle was ending a period and all work had to be turned in or be cancelled. It was only the customer who stepped in and allowed the work to continue, and then it took two additional months while different offices were considered, then dropped, as points for handoff. The CLEC themselves finally took control and designed the circuit in offices where they had no POP[8], and between much larger carriers. The cutover worked, and the customer was satisfied with service instead of excuses.

Building a telecommunications wholesale operation requires a base of operations. A warehouse equipped with a functional test bed. A test bed where radio sets is placed back-to-back and stressed to find limits of performance. A place where technicians can bring in suspected defective equipment from the field and have it tested. There is a need to "practice" the art of maintenance, and perfect it before "performance" in front of the customer. "The shop" is a long abandoned concept where knowledge gets passed from journeyman to apprentice, and schools get held to teach new practices and perfect old ones.

From this shop comes written standards, agreed to by all concerned, along with documentation including run lists, rack face drawings and methods of procedure wrapped up together in an engineering package. The "construction and Installation" team meets with the foreperson daily before going into the field, allowing for lessons to be passed and details dealt with before going back into the field.

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[7] **CFA** – Carrier Facility Assignment, a technical specification of just where a circuit terminates in an office. Used as a reference point for handoffs between carriers to complete service end to end for a customer leasing from both.

[8] **POP** – Point of Presence, an office where a carrier leases or sub-leases space from another.

Cutover

When the "C&I" team completes their work, with all alarm wiring and circuits tested, a meeting takes place. The customer bears witness to the "maintenance and operations" technician taking control and responsibility by signing off an acceptance sheet that he is satisfied. Only then will the circuit become "revenue traffic" and billable. This ensures a definite separation between departments with differing timelines, performance goals and expectations.

A Microwave Secret

Technicians and engineers with long history of practice know that the present "digital" standards did not evolve overnight. It was the providence of Western Union Telegraph Company to pioneer ones and zeroes, in the form of Morse code, in the 19th century. This long forgotten regulated monopoly used microwave as a basis for improving on wire by placing digital circuits on analog radio using "Voice Frequency Carrier Telegraph", or what is now called a modem, to save space and increase capacity over wires strung on telephone poles beside railroad tracks.

Digital microwave came along to great industry accolades in the late 1970's. By the 1980's the Northern Telecom RD radio came to dominate the non-AT&T microwave business by building a model that operated digitally on top of analog. Because all microwave radio is built to "up convert" and then "down convert" signals, the rules of analog transmission apply. And because analog is still used, it is not a case of "black or white". Many shades of gray exist, where performance of an individual component slowly deteriorates long before failure. This radio has a built-in "NT45" analog history monitor that can, in the hands of a capable technician, yield numbers that indicate which module is becoming marginal. Every 15 minutes performance statistics showing phase hits, gain hits, impulse noise at three thresholds, as well as dropouts, tell the tale of the analog system that underlies the digital. And this information is available remotely, at the technicians bedside, should he need it in the middle of the night. This tell what component to bring with them when they have to go outside and gives confidence that time will not be wasted.

But such events as middle of the night won't happen if the system is rigorously maintained during the day. And to track such events, three additional layers are added.

Performance Monitor

On each radio path, a DS1 (or equivalent) circuit is set aside. Like customer revenue bearing traffic circuits, it is given a number. And it has the highest restoration priority setting. At the ends of this circuit lie test sets, a transmitter and receiver set that communicate constantly over the link. And to each set is a

SNMP[9] or serial link that reads the 15-minute performance test results and feeds these into a database for review by management in the Daily Radio Report showing network elements with less than 100% performance. This also is used to track system performance and generate proof-of-performance statistics for each customer every month.

Real Time Alarms

At each site, a remotely polled alarm device watches each radio, tower lamp, high and low temperature, and door alarms. This in turn reports to the NCC where a logging printer keeps a printout of each alarm. Network management software, in conjunction with the SNMP software, massages bursts of alarms and causes a red lamp to flash, indicating current service degradations exist, to alert service personnel to real time conditions. Major, minor and alert status is kept track of automatically and history reports can be scanned at a later date to correlate customer or management inquiries for chronic trouble tracking. All telecom companies have this equipment; few know how to properly manage the data.

Proof of Performance

Premium Service means just that, going the extra mile. Each customer will be given a web site to securely access a performance monitor of just his or her circuits. This consists of a "T-Smart CSU" at each end of their line that, in addition to performing standard CSU[10] functions, it also tests the line and monitors "hit counters" set to record at 15 minute intervals, any degradation of service, it's duration and direction of travel as well as severity. This alone should build confidence in the carrier. Should the customer be dissatisfied, or have a question, they can generate an outage report or ask a question and get a response acknowledging their service request input 24/7.

The Database to end all Databases

The essential difference between the premium service company being proposed and those in existence today is the way the relational database gets used. A SQL database provides the following essential functions. Three separate programs draw upon one single set of integrated data:

A listing: Circuits and Systems

A1) Create assignment tables for each system between network nodes, or sites, included here. The color codes indicate revenue status:
RED--jeopardy, those circuits in revenue that the customer is not using.

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[9] **SNMP** – Simple Network Management Protocol, a standard to monitor and control network elements remotely.

[10] **CSU** – Customer Service Unit, a device placed in the customer premises that allows remote testing to determine the nature of troubles and their location, whether on the network or in the customer equipment.

GREEN--active producing revenue circuits and systems.
BLUE--found revenue, or projected to produce revenue. This comes from assumption of a network where the company that sold to us didn't keep good records. It is also used to denote new service being installed to reserve capacity, as well as circuits and systems on reroute or irregularity status.
A2) build (eventually by actually drawing) Circuit Layout Records, Design Layout Reports for each circuit and system.
A3) draw and populate building, tower face, and rack layouts for every network element in service.
A4) create run lists for cabling, alarm assignment tables showing tie cables, terminal blocks and demarcation points in central sites and customer field locations.

B listing: Trouble Desk

B1) Allow customers to enter from secure web terminals trouble tickets, be able to track outages, escalations and RFOs (reason for outage).
B2) Allow employees to enter customer complaints and track the same as B1, either remotely (home) or at the NCC (Network Control Center).
B3) Permit customers to view active status of each circuit, as well as 15 minute historical status for up to 90 days, on circuits with T-SMART or other CSU's having real time performance tracking capabilities.
B4) Provide automatic Daily Radio Reports summarizing system outages in summary form at the start of the RADAY (radio day) for NCC and management.
B5) Control and manage the Irregularity Report showing systems/equipment or services on reroute or other irregular status.
B6) Track PMR (preventative maintenance routines) status showing each site PMR status, as well as the number of PMR[11]s performed by each technician. A sample PMR book for Mount Allison is included. This is the activity where the vast majority of technician's time will be spent.

C listing: Billing and Service Level Agreements

C1) Tied to each network element is a cost figure. Costs are rent, facility charges, utility charges, and PMR hours spent.
C2) Tied to each circuit is a revenue figure. Revenue is from tarriffed items such as facility, channel terminations, and contractual items such as excess customer-caused outage reports and temporary service connection charges. This is a tremendous capability to make us stand out from the competition. We can justify costs and expenditures from these two items.
C3) Automatic rebate generation to customer bills when we fail to provide them with service due to outages.
C4) Creation of billing statements.
C5) Status reports to management showing cost breakdowns of providing service by site, customer, service type. This allows profitability to be judged for each.

[11] **PMR** – Preventative Maintenance Routine, a procedure run that prevents outages in advance.

OKB DSX1 audit

FROM:	CHANNEL	SYSTEM	EQUIPMENT	SLOT	TYPE - BAY	DSX1	TO:	DSX1	DS1 SERVICE	CONFIRMED	DATE	CUST
OKB-ICG	ICG DACS	SDF13	Tellabs DACS	19	5500 201.7.4	301.10.4-19	BRK	301.9.7-11	ATT12406	ESF live	17-Apr	ATT
OKB-ICG	ICG DACS	SDF13	Tellabs DACS	20	5500 201.7.4	301.10.4-20	OKN	301.9.6-31	MCI11112	ESF live	17-Apr	MCI
OKB-ICG	ICG DACS	SDF14	Tellabs DACS	23	5500 201.7.4	301.10.4-51	BRK	301.9.7-8	MCF12407	A0S	17-Apr	MCF
OKB-ICG	ICG DACS	SDF15	Tellabs DACS	10	5500 201.7.4	301.10.5-10	BRK	301.9.7-21	MCF12413	ESF live	17-Apr	MCF
OKB-ICG	ICG DACS	SDF15	Tellabs DACS	13	5500 201.7.4	301.10.5-13	OKN	301.9.6-48	ICG12442	ESF live	17-Apr	ICG
OKB-ICG	ICG DACS	SDF15	Tellabs DACS	14	5500 201.7.4	301.10.5-14	OKN	301.9.6-49	ICG12443	ESF live	17-Apr	ICG
OKB-ICG	ICG DACS	SDF15	Tellabs DACS	15	5500 201.7.4	301.10.5-15	OKN	301.9.6-50	ICG12441	ESF live	17-Apr	ICG
OKB-ICG	ICG DACS	SDF15	Tellabs DACS	20	5500 201.7.4	301.10.5-20	BRK	301.9.7-22	MCF12408	A1S	17-Apr	MCF
OKB-ICG	ICG DACS	SDF15	Tellabs DACS	22	5500 201.7.4	301.10.5-22	OKN	301.9.6-46	AER12396n	A1S	17-Apr	AER
OKB-ICG	ICG DACS	SDF16	Tellabs DACS	5	5500 201.7.4	301.10.5-33	BRK	301.9.7-5	MCF12410	ESF live	17-Apr	MCF
OKB-ICG	ICG DACS	SDF16	Tellabs DACS	9	5500 201.7.4	301.10.5-37	BRK	301.9.7-13	ICG12439	D4 live	17-Apr	ICG
OKB-ICG	ICG DACS	SDF16	Tellabs DACS	14	5500 201.7.4	301.10.5-42	BRK	301.9.7-25	MCF12409	A1S	17-Apr	MCF
OKB-ICG	ICG DACS	SDF16	Tellabs DACS	15	5500 201.7.4	301.10.5-43	BRK	301.9-7-10	ATT12405	ESF live	17-Apr	ATT
OKB-ICG	ICG DACS	SDF16	Tellabs DACS	16	5500 201.7.4	301.10.5-44	BRK	301.9.7-6	MCF12411	ESF live	17-Apr	MCF
OKB-ICG	ICG DACS	SDF16	Tellabs DACS	19	5500 201.7.4	301.10.5-47	BRK	301.9.7-15	MCF12412	ESF live	17-Apr	MCF
OKB-ICG	SDF49	NSR108555	DACS TO MUX	1	150 101.4.2.1	301.10.1-1	BRK	301.9.7-2	ATT12445	ESF live	17-Apr	ATT
SFO-ICG	SFB F7	NSR833151	OKBSFO03	17	300 201.11.2.1	301.9.9-17	HBI	301.9.8-17	MCI10448	A1S	17-Apr	MCI
SFO-ICG	SFB F7	NSR833151	OKBSFO03	18	300 201.11.2.1	301.9.9-18	HBI	301.9.8-18	MCI10449	A1S	17-Apr	MCI

Organization

Capable Stewardship, in practice, means paying attention to the human element more than any other aspect of a premium service business. While sites, systems and equipment change, there must be a constant and continuous effort made to establish and protect a long term business plan. No asset the proposed company will have is more precious to meet this goal than the human element. Historically, stability has been met by allowing the workforce to join a collective bargaining unit. While this may mean increased initial labor costs, over the long term it actually saves money. How? By allowing the workers to unionize, their job security is increased. When there is a considerable investment in training, and in building up local knowledge over the years, in the mind of each technician and technical staff employees, it costs money to the company in terms of lost productivity when an employee leaves. When a new employee first starts, that person is a liability. They must become productive quickly in order to pass their probation period. Yet productivity during the first years comes at the cost of training, and increased management time spent in apprentice supervision.

By the end of the second year of operations, if successful in making money and on track to retiring initial startup costs, the new company will allow the workers to form their own collective bargaining unit and enter into good faith negotiations with management. This not only increases worker confidence, it also allows management to know, in advance, what their labor costs will be. It increases morale by letting the workers know wages, job descriptions, terms and conditions.

By allowing wages, terms and conditions to be known to all employees, the veil of secrecy between the work force and management never materializes. This freedom to publish information regarding labor relations keeps rumors from starting and morale high.

Yet labor relations are but the beginning of how information gets distributed with the company. Based upon the Bay Area Teleport model, every month a statistical review takes place. This shows the percentage of PMR's met, of projects completed on time and budget. Additional details like the percent of cost, per site, for each circuit, published in spreadsheet form, are part of the end result of the database described above. Of course this not only tracks figures such as rent and utility charges, but facility costs as well. This enables management to truly be able to understand costs of providing service when other companies only can guess.

Premium Services Concept

Telecommunications transport is the basic service, on a wholesale basis, provided. Yet, due to costs associated with preventative maintenance, added to fixed costs and overhead, provide little room for the profit margins that must be

made in order to retire debt and provide fertile grounds for capital growth generation. This leads to the "heart" of this business — Premium Services.

Many customers find it a struggle to manage their own network. Especially when dealing with the ILEC, the inevitable moves, changes and adds are boring, detail oriented work few want to deal with. The typical reseller wants to simply sell service and grow their bottom line. Details of traffic loading and analysis, developing cost models based on artificial intelligence prove to be to much for all but the largest and well run operations.

This company has as it's disposal the human elements to develop and deploy such premium service concepts, hopefully including a sales force with a 15 year track record selling microwave services on a commercial basis, in the bay area.

It's Showtime!

One concept the giant money machine telecom companies forget is how to make money! Nowhere is this more evident in the area of temporary connectivity. Wireless networking is just now starting, with the "Wi-Fi" concept, to begin to tap the relay-point on a mountain top or building to customer model. There is a whole different market, where, if the reputation is developed and rigorously maintained, profits are measured not by the month, but by the hour. There are many possibilities, but to simplify, we will discuss but two:

A salesperson from a major CLEC is close to closing a deal for a DS3 with a customer. The customer has a huge pent up demand for services and is tired of being abused by the ILEC. Yet they "wanted the service yesterday". The CLEC sales manager gets the call "can we promise service in two weeks?" The manager goes to the circuit provisioner and leans hard over their desk, their monthly quota hanging by a thread.. The provisioner can only call the ILEC, who has that famous golden last mile sewn into their vest pocket, and beg for the expedite. The ILEC, of course, takes the lead from the CLEC provisioner and in turn passes it to their sales force, who, of course, sells an expedited connection and gets the DS3 despite the customer wanting to go elsewhere. It's true, it's not fair, but it happens.

Yet, where there's a will, there surely must be a way. That is called a non-penetrating roof mount and a quad-pod stand borrowed from the satellite industry, coupled with Nashua 357 premium grade duct taping the wires across the sidewalk and into the customer's switch or data center under the side door. Or perhaps the location is in a hole, away from the line-of-site to a microwave backbone location. In that case a truck with a pole, similar to a TV stations remote news gathering truck, gets parked nearby, as a repeater.

This whole concept of rolling a DS3 out the door and having service within 24 hour's notice to the customer, who wanted it yesterday, takes extensive training,

rehearsal time to practice, and an organization dedicated to this type of service. Yet it has been successfully deployed in the bay area, by a company called Watson Communications. The idea is to sell service bypassing the ILEC and their disclosure of confidential sales leads, and turn a temporary connection into a permanent one. And the customer will remember it long after the truck is gone. A permanent Steerable antenna is mounted on the tower above the cities to be covered, pointed to the proper direction by the NCC.

Emergency

]A suitable use for the temporary antenna system is use in emergencies. An emergency can be an outage on a fiber optic cable, or disruption by any other means. A rehearsal needs to be done, like fire departments, practiced and proficient, and ready to respond at a moments' notice. Once the facilities are in place, we will offer reroute capability to other carriers who have needs and are willing to pay premium prices to save their reputation and restore confidence. Likewise, we intend to offer restoration services to government agencies and plan with them for use of the protect channel during times of earthquake or other regional emergency. Microwave is so versatile, so easily steerable than an OC3 can be set up within hours, depending upon terrain, to a truck as described above.

Surgery

A medical provider wants to show open heart surgery at the Mark Hopkins Hotel in Downtown San Francisco, in the penthouse "St. Francis" room. They want a temporary HDTV feed, which is only 1/3rd of a DS3 in speed, to about 25 surgeons. The only way they can get their service is to schedule an uplink truck and satellite feed to the roof of the hotel, today. The ILEC cannot run fiber up 16 floors, even if they could pull city permits to do the underground. This company could compete with satellite, and provide something satellite cannot, a two way video circuit. Satellite only does audio, via phone dialup, for the real time interaction necessary to sell the hospital the latest technology. Either that or fly all the medical staff to a convention in New York.

Again, as with sales to provide premium services to the standard telecom provisioner wanting competition who keeps it confidential, it is practice in private and performance in front of the customer that pads the bottom line and takes much fuller advantage of the fixed costs of tower rent, than currently considered.

VI Loma Prieta scorecard

During this I have avoided mentioning the main selling point of microwave in a world increasingly relying upon fiber. This is earthquake country. Basing the potential for a future earthquake to impact telecommunications is easier if a look at the most recent past is considered. Based upon conversations with many

providers, I have developed the following as a scorecard of those providing service on October 17th, 1989.

Right after an earthquake every carrier is confronted by:
- loss of capacity due to cut cables and downed offices
- dramatic increase in use of switching equipment, often overwhelming.

MCI

Substantial impact to both switch and transport systems during Loma Prieta. The Hayward switch was not failed, but due to fiber cuts on both sides of their bay area ring, it was effectively cut off. Their San Francisco switch continued to function and thus they had limited switch capabilities.

SPRINT

Sprint fared the worst, and took two weeks to recover. This was mainly due to being cut off from the rest of their network when the fiber they'd just installed was cut just east of Crow Canyon in the east bay.

AT&T

AT&T came through in good shape, mainly due to the massive size of their network and the redundant paths and pre-planned alternate routes and reserve capacity held for just such an occasion.

PAC BELL

The dominant LEC continued to function on all switches, which were substantially impacted by the increase in load, but which had pre-planned trunk routing in place. Pac Bell's San Francisco switches blocked incoming calls to create space allowing outgoing calls from local subscribers. Pac Bell network management center played a key role in allocating trunk capacity and even managed annunciator messages at toll and end offices remotely.

WTCI

This long distance "carrier's carrier" had 78 miles of microwave which were not disrupted. The main issue facing WTCI was power to supplant the battery plant at San Francisco. This was done and no outage to any customer occurred.

BAT

With 613 miles of microwave, this network also experienced no outage. Bay Area Teleport gained a considerable reputation mainly due to the ability to accommodate requests for reroutes from other carriers.

Conclusion

Such are the possibilities, as seen in real life practice, here in the bay area, that take advantage of those nearby mountain tops. By intelligent reuse of a fixed asset, such as a tower, and marriage of the many historical ways that microwave has played such an important part, are all possibilities. These are the goals for a company who takes pride in all of what worked in the past and makes profit in the future.